NASA-JPL: Responses to Comments from the Regional Water Quality Control Board (RWQCB) on the OU-1 Expanded Treatability Study Work Plan

No.	Comment	Response
1	Section 1.3, Paragraph 5: Provide a copy of the results of the laboratory microcosm tests conducted on NASA/JPL groundwater to determine the effectiveness of in situ biodegradation of perchlorate.	The microcosm work was completed under the United States Department of Defense (DoD) Strategic Environmental Research and Development Program (SERDP). The overall results of the laboratory microcosm study are provided in Envirogen's SERDP presentation (click here to view presentation).
2	Section 2.1, Paragraph 2, and Section 2.2, Paragraph 1: Regional Board staff require that the groundwater must be treated to applicable regulatory levels before reinjection.	NASA requests clarification on this issue. In situ biological treatment, as described in the work plan, is applicable based upon the EPA interpretation of RCRA Section 3020 (EPA, 2000). Also, the proposed approach complies with the substantive requirements of RWQCB Order No. R4-2002-0030, which allows for a compliance point downgradient of the treatment area (RWQCB, 2002).
3	Table 2-1: Replace best demonstrated available technology (BDAT) with 4 and 3 ug/L respectively for perchlorate and 1,4-dioxane. These concentrations are the California Department of Health Services action levels for perchlorate and 1,4-dioxane. Please also include N-nitrosodimethylamine (NDMA), 1,2,3-trichloroproane (1,2,3-TCP), and vinyl chloride among the analytical parameters to be monitored in the untreated and treated groundwater samples. The analytical method detection and reporting limits for an analyte must be lower than its maximum contaminant level (MCL)/action level concentration.	Based on previous field-scale implementation, FBR systems are capable of removing perchlorate down to non-detectable levels (i.e., <4 µg/L). Concentrations of 1,4-dioxane in extracted groundwater are expected to be near the corresponding California action level of 3 µg/L. During groundwater sampling January 2002, the following concentrations of 1,4-dioxane were observed: ❑ MW-7: 5 µg/L ❑ MW-13: 4 µg/L ❑ MW-16: 10 µg/L ❑ MW-24 (Screen 1): 3 µg/L ❑ MW-4 (Screen 2): non-detect ❑ MW-17 (Screen 3): non-detect Also, it is anticipated that the LGAC system will achieve some removal of 1,4-dioxane.

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		NDMA, 1,2,3-TCP, and vinyl chloride have not been detected at NASA-JPL during previous groundwater monitoring events. NDMA analysis was performed annually in 6 wells that exhibit historical high VOC concentrations (same wells as 1,4-dioxane). The chemicals 1,2,3-TCP and vinyl chloride were analyzed quarterly as part of the VOC list (the detection limit for both is 0.5 µg/L). Therefore, these chemicals are not chemicals of interest at NASA-JPL.
4	Section 3.2: Include groundwater flow and transport model input parameters used and the lateral and vertical extent of the extraction well capture zone.	Table 3-1 contains the groundwater flow and transport model input parameters and has been updated to include recharge input. The capture zone width and height were 1,150 and 90 ft for Case 2 and 985 and 90 ft for Case 7. This capture zone information has been included in Section 3.2.
5	Section 4.5, Paragraph 1: Take measures to ensure that the piping is equipped with valves to present backflow into the extraction well, to the ex situ groundwater treatment system (ESGWTS) and to the in-situ bioremediation system (ISB).	All extraction and injection wells will be outfitted with check valves to prevent backflow (see Figure 4-2).
6	Section 4.5, Paragraph 2: If any contaminated soil is encountered during excavation of the trenches for underground pipeline, replace that soil with unimpacted soil backfill.	Paragraph 2 in Section 4.5 has been modified as follows: "It is estimated that excavation and backfill will be required of approximately 650 linear ft of trench, 3 ft deep, and 2 ft wide. If visual staining of native material is noted, the stained soil will be placed in a drum, analyzed, and disposed off site as appropriate. Otherwise, the native material will be used as backfill."
7	Table 5-2: It is indicated in the "Treatment Effluent" column that treated effluent from the ESGWTS will not be analyzed for perchlorate, 1,4-dioxane, and VOCs. You are required to analyze the treated effluent samples collected from both the ESGWTS and ISB for these parameters, along with NDMA and 1,2,3-TCP on a weekly basis during system performance and compliance monitoring. Also, include all the above parameters in the baseline monitoring. Include monthly analyses of extraction well samples for metals and hexavalent chromium. Include all the ISB and ESGWTS system influent and effluent sample analytical results and untreated extraction well groundwater sample	All analytical results will be provided in the quarterly remediation progress reports. Table 5-2 has been revised as follows: ❑ The title "Treatment Effluent" has been changed to "Multimedia Filter Outlet." In general, the chemicals will be sampled at each extraction well and before and after the treatment process that directly affects its treatment/removal. Additional samples at the end of the treatment train would not provide additional information to support the removal efficiency of the system. ❑ See the response to Comment No. 3 regarding NDMA and

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	analytical results in your quarterly remediation progress reports.	1,2,3-TCP. ❑ The monthly analyses of metals and hexavalent chromium at the individual extraction wells will be conducted. In addition, metals and hexavalent chromium will be sampled for at the LGAC inlet and at the multimedia filter outlet.
8	Figure 5-1: A "significant rebound" will be assumed to occur when the rebound concentration exceeds 20 percent of the pre-rebound concentration. The rebound period is assumed to be at least one month in duration and would start after the remediation system is shut-down.	The determination of "significant rebound" should be based not only on a comparison of the rebounded value to the pre-rebound concentrations but also on site-specific chemical fate and transport results, risk, and cost-effectiveness (considering remedial action OU-3). NASA will coordinate closely with the regulatory agencies for review and approval prior to initiating any actions to permanently terminate and/or dismantle the system.